

Amendments to the Drawings:

The drawings have been amended to eliminate common reference signs for distinct features and to correct a misspelling of “Perpendicular.” Corrected drawing sheets are appended to this paper.

REMARKS/ARGUMENTS

The examiner is thanked for thoroughly reviewing the subject patent application. Applicants wish to point out the major features of their claimed invention, which is a shielded PMR write head having an additional shield stitched (plated) onto the main shield and positioned between the main shield and the head write gap. The cross-sectional shapes of the stitched shield and the main magnetic pole tip in the ABS plane of the write head are truncated wedges of particular shape (as shown in Fig. 2a) and claimed dimensionality (as in claims 2-6). In particular, the truncated wedge shape of the shield is associated with a width W_{SWSLE} of the shield that is wider than the width of the main pole. This illustrated and claimed shape, coupled with the fact that the width of the shield W_{SWSLE} exceeds the width of the pole, is responsible for the superior performance properties of the head, that includes: a) elimination of lateral flux leakage and adjacent track erasure beyond the width of the pole tip, b) a superior head field gradient profile, and c) concentration of the flux within the desired track-writing width. As indicated graphically in Fig. 3a-Fig. 8, substantial testing has demonstrated the performance qualities of the claimed shape over prior art write heads. Having thus briefly explained the present claimed invention, Applicants would like to address the specific objections raised by the Patent Examiner.

Objections to the drawings

The drawings have been amended to eliminate common reference signs for distinct features and to correct a misspelling of “Perpendicular.” Corrected drawing sheets are appended to this paper.

The Specification

The Specification has been amended to update the “RELATED APPLICATION” section and the first paragraph on page 3 has been amended to be consistent with amendments to the drawings and to follow Examiner’s suggestion for clarification of line 15.

Claim Rejections-35 USC 112

Applicants respectfully request a reconsideration of the rejections of claims 1-6 as being indefinite for failing to point out and distinctly claim the subject matter which applicant regards as the invention. Amended claim 1 now recites a “shielded PMR head” in its preamble, so the recitation of “a PMR head” that appears in the first claim element and the recitation of “a stitched write shield” that appears for the first time in the third claim element are no longer rendered indefinite by the preamble. Similarly, claims 2-6 now recite the “shielded PMR head” in their preambles, so there is no indefiniteness with respect to the recitation of “a PMR head.” The phrases, “the main pole” and “the ABS plane,” have been replaced by “a main pole” and “an ABS plane.” Applicant believes that all other sources of indefiniteness have also now been removed.

Claim Rejections- 35 USC 102

Applicants respectfully request a reconsideration of the rejection of claim 1 under 102(e) as being anticipated by Hsu (US 2005/0068671) for the following reasons. While

Hsu teaches a shielded PMR head, the head as shown in either Hsu's Fig. 2 or in Hsu's Fig. 5 is different from the present head as claimed in amended claim 1. Hsu states that "three critical parameters in this design are 1) the gap between the main pole 42 and the trailing shield 44; 2) the ABS to soft underlayer spacing, and 3) the trailing shield thickness." (Hsu, paragraph [0016]). Hsu's shield is not shaped in the manner of the present claimed shield, in which the critical parameters are the thickness of the stitched shield and the design parameter $1/2(W_{\text{SWSLE}} - W_{\text{MPTE}})$. That design parameter relates to the width difference between adjacent edges of the shield and the pole, which, as was shown by extensive experimentation, is a determining factor in producing the superior performance of the present claimed invention. Further, the width dimension, W_{SWSLE} , of the present claimed invention is greater than the maximum width of the main pole, which is also responsible for the following advantages of the claimed invention: a) elimination of lateral flux leakage and adjacent track erasure beyond the width of the pole tip, b) a superior head field gradient profile, and c) concentration of the flux within the desired track-writing width. In Hsu's invention, the corresponding width is less than the width of the main pole. Applicants submit that the narrower width of Hsu's shield relative to its pole would lose the shielding effect that is provided by the shield of the present claimed invention and, furthermore, would produce a head field gradient that is degraded relative to that which is provided by the present claimed invention.

The present design parameters differ from Hsu's parameters, as would be expected given the difference in their designs. Hsu's Fig. 5, showing one embodiment of his design, shows the shield (44B) as stitched to a pedestal (44A). Both the shield and pedestal are rectangular in cross-section, not the truncated wedge shape of the present

invention. Although Hsu does not indicate specific performance parameters as measured using his design, the present application shows such measurements in Fig's 3a, 3b, 4a and 4b and shows the degree to which they are sensitive to the design parameters in Fig's 5 and 6. Applicants would respectfully argue that their invention, as claimed in amended claim 1, differs significantly from that of Hsu as a result of the novel truncated wedge design that resulted from significant experimentation and, further, as a result of the shield width W_{SWSLE} being greater than the maximum pole width.

Applicants respectfully request a reconsideration of the rejection of claim 1 under 102(e) as being anticipated by Taguchi (US 2004/0212923) for the following reasons. According to his Fig. 6, Taguchi teaches a PMR write head with an auxiliary pole (42) and a write shield (45) that are not of the form of the present claimed invention. The remaining figures 7, 10, 11, 13, 14, 15, 17 18 and 20 all show embodiments with differently shaped write shields that are laminated in various configurations. None of these shields show the truncated wedge shape of the present claimed invention. In each figure, the pole tip (41) of Taguchi, is shown opposite a large write shield, (46) in Fig. 10, (51) in Fig. 11, (53) in Fig. 14, (52) in Fig. 13, (61) in Fig. 15, (71) in Fig. 18, and (72) in Fig. 20. All of Taguchi's write shields are analogous to the main write shield of the present invention which is shown as (55) in Fig. 2a of the subject application. None of Taguchi's write shields show the stitched truncated wedge of the present claimed invention, which is shown as (40) in Fig. 2a of the subject application. Applicants respectfully argue that Taguchi's PMR write head does not teach the stitched write shield of the present claimed invention.

Similarly, Applicants request reconsideration of the rejection of claim 3 of the present claimed invention as being anticipated by Taguchi. Claim 3 of the present claimed invention recites the thickness of the stitched, truncated wedge shaped write shield that does not appear in Taguchi's invention.

Applicants respectfully request a reconsideration of the rejection of claim 1, 4 and 6 under 102(e) as being anticipated by Lille, (US 2005/0068673) for the following reasons. Lille discloses a PMR write head having a shaping layer coupled to a pole tip for focusing flux to the pole tip and a trailing shield that causes the lines of flux to enter the recording medium at an angle. According to Lille, the trailing shield : "bends the magnetic flux lines. More particularly, the magnetic field that comes out of the probe pole tip 826 enters the media at an off-normal angle, which may help write more stable bits in the media." [0046]. The stitched shield of the present claimed invention does not play such a flux bending role nor is it configured to do so. Lille, in fact, does not disclose any shield that performs the function of the stitched, wedge-shaped shield of the present claimed invention. With regard to amended claim 4, that claim now recites only the material structure of the stitched write shield. Lille, in his [0042] discloses that the pole tip is formed of a ferromagnetic material, but he makes no reference to a stitched write shield.

With respect to amended claim 6, Applicants would argue that the width and thickness of the alumina write gap layer must be consistent with the overall shape of the truncated wedge formed by the placement of the stitched shield and magnetic pole. Since Lille does not disclose the shape and dimensions of the shield/pole combination of the present claimed invention, the fact that his write gap layer satisfies the objects of his

invention does not suggest that it would satisfy the objects of the present claimed invention.

Claim Rejections-35 USC 103

Applicants respectfully request reconsideration of the rejection of claims 2, 3 and 5 under 35 USC 103 as being unpatentable over Hsu et al for the following reasons.

As indicated by the graphical data presented in Fig's 3a-6 and the supporting descriptive material in the Specification, the shape of the stitched shield and pole were not mere design choices, but a result of extensive experimentation. It is not merely the dimensions of the shield and pole that determine the performance of the present claimed invention, but their combined cross-sectional shape and the difference in widths between their adjacent edges that produces the critical parameter $1/2(W_{\text{SWSLE}} - W_{\text{MPTE}})$. Further, as stated above, the fact that W_{SWSLE} of the shield exceeds the maximum width of the main pole contributes to the advantageous properties of the invention: a) elimination of lateral flux leakage and adjacent track erasure beyond the width of the pole tip, b) a superior head field gradient profile, and c) concentration of the flux within the desired track-writing width. Nothing in Hsu would suggest the particular shape and dimensional combinations of the present claimed invention nor the fact that its performance would be significantly superior to that of the prior art.

Conclusion

The Examiner is thanked for thoroughly reviewing the application. All claims discussed above are now believed to be allowable. If the Examiner has any questions regarding the above application, please call the undersigned attorney at 845-452-5863

Respectfully submitted,

A handwritten signature in black ink, appearing to be 'S. Ackerman', with a long horizontal flourish extending to the right.

Stephen B. Ackerman, Reg. No. 37,761